

Fishes from the Kashmir Valley¹

BY

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(With two plates)

In March-April 1954 the late Dr. Sunder Lal Hora visited the Kashmir Valley and made an extensive collection of fishes, which on his return to Calcutta he kindly passed on to me for study. As regards the topography of the Kashmir Valley and its drainage, he wrote that the Valley is 'about eighty miles long, about twenty to twenty-five miles broad, and on the average rising about 6000 ft. above sea-level. It is flanked on almost all sides by snow-capped mountains. The Jhelum River which originates in its south-eastern corner traverses its whole length and is supplied by several spring-fed and snow-fed streams as well as by its all great water reservoirs, the most important of which are the Wular, the Dal, and the Manasbal lakes.' (Hora *et al.*, 1955).

Up to now the most important treatise on the fishes of Kashmir is Heckel (1838) : FISCHE AUS KASCHMIR, which contains descriptions of sixteen species, all described as new to science. In 1844 Heckel published 'Fische Kaschmir's' in Von Huegel's KASCHMIR UND DAS REICH DER SEIK (Bd. 4, abth. 2, pp. 351-384) with a few minor changes. McClelland (1839) in the 'Supplement' to his monograph on Indian Cyprinidae commented on Heckel's species from Kashmir, which have also found mention in volumes 15 and 16 of the HISTOIRE NATURELLE DES POISSONS (Valenciennes, 1840 & 1842). Since then notable contributions concerning the ichthyofauna of Kashmir have been those by Steindachner (1866), Günther (1868), Day (1876, 1878*a*, 1878*b*), Chaudhuri (1909), Hora (1922*a*, 1922*b*, 1934, 1936, 1939), Mukerji (1936), Misra (1949), and Hora & Silas (1952 *a* and *b*). In addition, there are several references to sport-fishing in Kashmir, of which Ross (1916) and Mitchell (1918) deserve special mention.

The examination of the fresh material as well as that already present in the fish collection of the Zoological Survey of India has enabled me to codify the nomenclature of the species described by Heckel (*op. cit.*), as given in Table 1.

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Misra (op. cit.) has shown that Heckel's species *Schizothorax plagios-tomus* and *S. sinuatus* were based on male and female specimens of the same species respectively, and as such the specific name *S. plagios-tomus* (= *Oreinus plagios-tomus*) which has priority is used. I have compared a few specimens from the Kashmir Valley referable to *Varicorhinus diplostomus* Heckel (= *Tylognathus valenciennesii* Heckel) with *Labeo dero* (Hamilton), which species also occurs in the Indo-Gangetic water-sheds along the Himalayas and do not find sufficient difference between them to justify the Kashmir specimens being considered specifically distinct. Hence I consider them conspecific and have here used the older name, *Labeo dero*, to indicate them.

Hora (1939) gave an excellent account of the mahseer *Barbus (Tor) putitora* (Hamilton) in the ' Game Fishes of India ' series published in the *Journal*, and indicated the distribution of the species as ' all along the Himalayas '. However, one significant omission is his non-inclusion of *Labeobarbus macrolepis* Heckel in its synonymy. I take this oppor-tunity to rectify this and at the same time support Hora's contention that infraspecific differentiation of the different species of mahseers must await detailed scrutiny of good series of material from the different watersheds along the range of distribution of the species.

Mukerji (1935) proposed a new subspecies *Crossochilus latius punjabensis* to denote the variety of *C. latius* from the Punjab and Afghanistan. I have compared specimens of this variety of *C. latius* from the Punjab with those from the Kashmir Valley referable to *Barbus diplochilus* Heckel (= *Varicorhinus barbatulus* Heckel) and find that in all diagnostic characters including the relatively smaller size at maturity as well as the smaller size of the eyes (diameter 4.2 to 5 versus 3.6 to 3.7 in head length in the *forma typica*) they are identical. This being the case, I propose considering the older name *diplochilus* as valid to denote the subspecies of *C. latius* occurring in the Kashmir Valley and the Punjab (Indus drainage), relegating *C. l. punjabensis* Mukerji to its syno-nymy.

Cobitis marmorata Heckel and *C. vittata* Heckel are at present re-ferable to the genus *Noemacheilus* van Hasselt, while Haig (1950) has shown that *Silurus lamgur* Heckel is a synonym of *Ompok bimaculatus* (Bloch).

More than any other Indian species of fishes, I feel, that inter-specific as well as inter-generic hybridization in nature takes place to a greater extent among the Schizothoracinae. The primary factors responsible for this in the Kashmir Valley are the great abundance in numbers of each species present, overlap in breeding time, and their spatial distribution in the Valley. The collection contains specimens showing intergrading characters attributable to hybrids, the easily recognisable combinations

TABLE

No.	Heckel (1838)	Valenciennes (XV, 1840 ; XVI, 1842)	Heckel (1844)
1.	<i>Schizothorax plagiosomus</i> p. 16, pl. 1.	<i>Schizothorax plagiosomus</i> XVI, p. 213.	<i>Schizothorax plagiosomus</i>
2.	<i>Schizothorax sinuatus</i> p. 21, p. 2.	<i>Schizothorax sinuatus</i> XVI, p. 214.	<i>Schizothorax sinuatus</i>
3.	<i>Schizothorax curvifrons</i> p. 25, p. 3.	<i>Schizothorax curvifrons</i> XVI, p. 216.	<i>Schizothorax curvifrons</i>
4.	<i>Schizothorax longipinnis</i> p. 27, pl. 4.	<i>Schizothorax longipinnis</i> XVI, p. 216.	<i>Schizothorax longipinnis</i>
5.	<i>Schizothorax niger</i> p. 29, pl. 5.	<i>Schizothorax niger</i> XVI, p. 217.	<i>Schizothorax niger</i>
6.	<i>Schizothorax nasus</i> p. 32, pl. 6.	<i>Schizothorax nasus</i> XVI, p. 218.	<i>Schizothorax nasus</i>
7.	<i>Schizothorax hügelii</i> p. 36, pl. 7.	<i>Schizothorax hügelii</i> XVI, p. 219.	<i>Schizothorax hügelii</i>
8.	<i>Schizothorax micropogon</i> p. 41, pl. 8, fig. 1.	<i>Schizothorax micropogon</i> XVI, p. 220.	<i>Schizothorax micropogon</i>
9.	<i>Schizothorax planifrons</i> p. 44, pl. 8, fig. 2.	<i>Schizothorax planifrons</i> XVI, p. 224.	<i>Schizothorax planifrons</i>
10.	<i>Schizothorax esocinus</i> p. 48, pl. 9.	<i>Schizothorax esocinus</i> XVI, p. 221.	<i>Schizothorax esocinus</i>
11.	<i>Labeobarbus macrolepis</i> p. 60, pl. 10, fig. 2.	<i>Labeobarbus macrolepis</i> XVI, p. 209.	<i>Labeobarbus macrolepis</i>
12.	<i>Barbus diplochilus</i> p. 63, pl. 10, fig. 1.	<i>Barbus diplochilus</i> XVI, p. 204.	<i>Tylognathus barbatulus</i> IV, p. 376.
13.	<i>Varicorhinus diplostomus</i> p. 67, pl. 11.	<i>Labeo diplostomus</i> XVI, p. 360.	<i>Tylognathus valenciennesii</i> IV, p. 378.
14.	<i>Cobitis marmorata</i> p. 76, pl. 12, figs. 1 & 2.	..	<i>Cobitis marmorata</i> IV, p. 380.
15.	<i>Cobitis vittata</i> p. 80, pl. 12, figs. 3 & 4.	..	<i>Cobitis vittata</i> IV, p. 382.
16.	<i>Silurus lamgur</i> p. 82, pl. 12, figs. 5 & 6.	<i>Silurus lamgur</i> XV, p. ix.	<i>Silurus lamgur</i>

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Günther (V, 1864 ; VII, 1868)	Day (1878)	Present nomenclature
<i>Oreinus plagiostomus</i> VII, p. 160.	<i>Oreinus plagiostomus</i> p. 530.	♂ <i>Oreinus plagiostomus</i> <i>plagiostomus</i> (Heckel)
<i>Oreinus sinuatus</i> VII, p. 161.	<i>Oreinus sinuatus</i> p. 529, pl. cxxiv, fig. 4.	♀ <i>Oreinus plagiostomus</i> <i>plagiostomus</i> (Heckel)
<i>Schizothorax curvifrons</i> VII, p. 164.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax curvifrons</i> <i>curvifrons</i> Heckel
<i>Schizothorax longipinnis</i> VII, p. 166.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax longipinnis</i> Heckel
<i>Schizothorax niger</i> VII, p. 164.	(<i>species inquirendae</i>) p. 531.	<i>Schizothorax curvifrons niger</i> Heckel
<i>Schizothorax nasus</i> VII, p. 166.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax nasus</i> Heckel
<i>Schizothorax hugelii</i> VII, p. 164.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax hugelii</i> Heckel
<i>Schizothorax micropogon</i> VII, p. 163.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax micropogon</i> Heckel
<i>Schizothorax planifrons</i> VII, p. 163.	(<i>species inquirendae</i>) p. 532.	<i>Schizothorax planifrons</i> Heckel
<i>Schizothorax esocinus</i> VII, p. 166.	<i>Schizothorax esocinus</i> p. 533, pl. cxxiii, fig. 4.	<i>Schizothorax esocinus</i> <i>esocinus</i> Heckel
<i>Barbus macrolepis</i> VII, p. 131.	<i>Barbus tor</i> (Hamilton) p. 564, pl. cxxxvi, fig. 5 & pl. cxl, fig. 1.	<i>Tor putitora</i> Hamilton
<i>Crossochilus barbatulus</i> VII, p. 72.	<i>Cirrхина latia</i> (in part) p. 548.	<i>Crossochilus latius diplo-</i> <i>chilus</i> (Heckel)
<i>Labeo diplostomus</i> VII, p. 57.	<i>Labeo diplostomus</i> p. 540, pl. cxxix, fig. 2.	<i>Labeo dero</i> (Hamilton)
<i>Nemachilus marmoratus</i> VII, p. 356.	<i>Nemachilus marmoratus</i> p. 620, pl. clv, fig. 9	<i>Noemacheilus marmora-</i> <i>tus</i> (Heckel)
<i>Nemachilus marmoratus</i> VII, p. 356.	<i>Nemachilus marmoratus</i> p. 620.	<i>Noemacheilus vittatus</i> (Heckel)
<i>Silurichthys lamgur</i> V, p. 36.	<i>Callichrous pabda</i> (Hamil- ton), p. 479, pl. cxi, figs. 2 & 3.	<i>Ompok bimaculatus</i> (Bloch)

being *Schizothorax esocinus* x *Schizothorax* sp., and *Oreinus plagiostomus* x *Schizothorax* sp.

In the fish collection of the Zoological Survey of India there is material of three species, *Schizothorax nobilis* McClelland (Z.S.I. Reg. No. 6532, and F. 5325/1), *S. intermedius* McClelland (Day's coll. Reg. No. 791) and *Lepidocephalichthys balgara* (Hamilton) (Day's coll. Reg. No. 2584), all labelled as having been obtained from 'Kashmir' or 'Kashmir lakes'. Since the exact localities are not clearly specified and as the present collection does not indicate their occurrence in the Valley, these species are not included in the synopsis to the species known from the Valley given at the end of this paper. So also several Indian species, namely *Chela cachius* Hamilton, *Esomus danricus* (Hamilton), *Barilius vagra* Hamilton, *Barilius bendelisis* (Hamilton), *Aspidoparia morar* (Hamilton), *Puntius sophore* Hamilton, *Puntius ticto* Hamilton, *Puntius sarana* (Hamilton), *Labeo bata* (Hamilton), *Cirrhinus mrigala* (Hamilton), *Channa* sp., *Ambassis* sp., *Mastacembelus armatus* (Lacépède), etc., occurring in the Jhelum drainage below the Kashmir Valley and in the Jammu area, and species such as *Noemacheilus yarkendensis* Day, *N. ladacensis* Günther, *N. stoliczkae* (Steindachner), etc., occurring in northern Kashmir beyond the limits of the Kashmir Valley are not included in the synopsis.

The absence of any specimens of *Barbus compressus* Day in the collection also lends support to Mukerji's contention (Mukerji, 1935) that the type locality of this species is probably not Kashmir, but more likely northern Burma and that the type specimen might have been inadvertently placed in a bottle containing a specimen of *Oreinus* from Kashmir.

The two exotic or introduced species in the Valley are the American Cyprinodont *Gambusia affinis holbrookii* Girard and the Brown Trout *Salmo trutta fario* Linnaeus. The former is a recent introduction and occurs profusely in certain places thereby indicating that it is well established in the natural waters of the Valley. The Brown Trout attains very large sizes in the cool waters of the Valley and there is one on record which weighed 16 lb. 1 oz. (Mitchell 1916).

The species, both indigenous as well as exotic, at present known from the Kashmir Valley may be classified as follows:

LIST OF SPECIES

Order : SALMONIFORMES

Family : SALMONIDAE

Salmo trutta fario Linnaeus

Order : CYPRINODONTIFORMES

Family : POECILIIDAE

Gambusia affinis holbrookii Girard

Order : SILURIFORMES

Family : SISORIDAE

- Glyptothorax kashmirensis* Hora
Glyptosternum reticulatum McClelland

Family : SILURIDAE

- Ompok bimaculatus* (Bloch)

Order : CYPRINIFORMES

Family : CYPRINIDAE

Subfamily : Schizothoracinae

- Oreinus plagiostomus plagiostomus* (Heckel)
Ptychobarbus conirostris Steindachner
Diptychus maculatus Steindachner
Schizothorax progastus McClelland
Schizothorax nasus Heckel
Schizothorax planifrons Heckel
Schizothorax esocinus esocinus Heckel
Schizothorax hugelii Heckel
Schizothorax longipinnis Heckel
Schizothorax micropogon Heckel
Schizothorax curvifrons curvifrons Heckel
Schizothorax curvifrons niger Heckel

Subfamily : Garrinae

- Crossochilus latius diplochilus* (Heckel)

Subfamily : Cyprininae

- Labeo dero* (Hamilton)
Labeo dyocheilus (McClelland)
Tor putitora Hamilton

Family : COBITIDAE

Subfamily : Botiinae

- Botia birdi* Chaudhuri

Subfamily : Noemacheillinae

- Noemacheilus rupicola* (McClelland)
Noemacheilus gracilis Day
Noemacheilus vittatus (Heckel)
Noemacheilus kashmirensis Hora
Noemacheilus marmoratus (Heckel)
Noemacheilus yasinensis Alcock

From the above list it is clear that the bulk of the indigenous fish fauna of the Valley is composed of the Palaearctic element (of central

Asiatic origin) while those of Indian origin are *O. bimaculatus*, *G. kashmirensis*, *C.l. diplochilus*, *L. dero*, *L. dyocheilus*, *T. putitora*, *B. birdi*, and *N. rupicola*. Of the latter, *G. kashmirensis* is endemic in the Kashmir Valley, but its congeners are predominant in the Oriental Region. Six species and one subspecies of *Schizothorax* (except *S. progastus* and *S. esocinus*) and three species of the genus *Noemacheilus*, namely *N. vittatus*, *N. marmoratus*, and *N. kashmirensis* appear to be endemic in the Valley. On the whole, the high percentage of endemism (about 42%) of the fish fauna of the Valley is noteworthy.

The key below embraces all valid species described by Heckel (op. cit.), those recorded by various authors from Kashmir Valley since that date, and those present in the collection under study. Specimens approximating very close to *Schizothorax progastus* McClelland and *Noemacheilus rupicola* (McClelland) are present in the collection. I find that the differences between *Schizothorax curvifrons* and *S. niger* are not sufficiently distinct to justify their treatment as separate species and hence the latter is treated here as a subspecies of *S. curvifrons*.

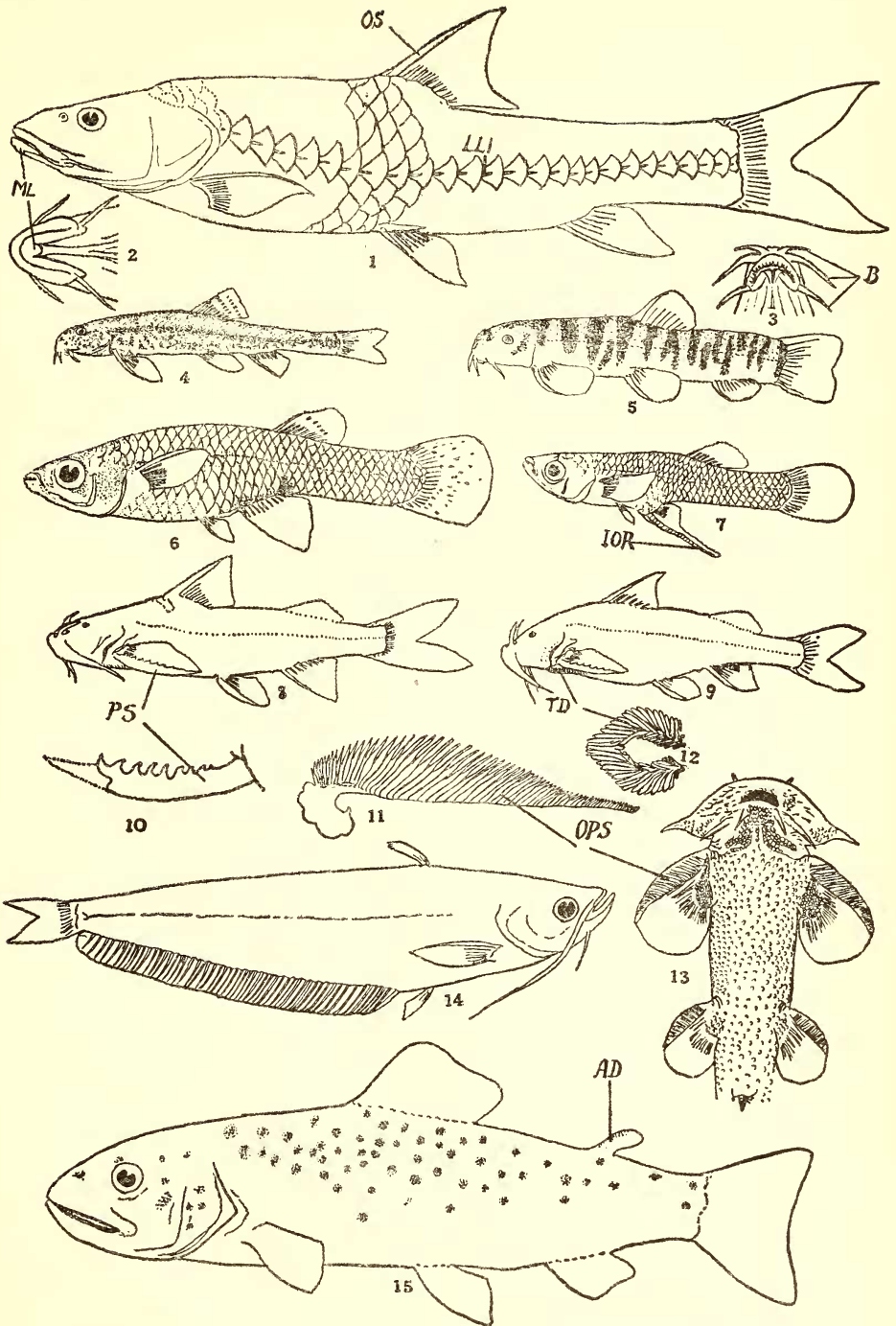
This account of the fishes of the Kashmir Valley will not be complete without a reference to the fossil fishes known from the area. Hora (1937) has described remains of Schizothoracinae (scales, one pharyngeal tooth, pectoral spine, and skeleton of caudal region) referable to *Schizothorax* or *Oreinus* [in all probability those of *S. curvifrons*, and *O. sinuatus* (= *O. plagiostoms*)] from the Karewas beds of Kashmir.

Details on the ecology of most of the species dealt with in this paper are embodied in an excellent article by G. Evelyn Hutchinson entitled 'Ecological observation on the Fishes of Kashmir and Indian Tibet' (*Ecol. Monogr.* 9 : 145-182. 1939).

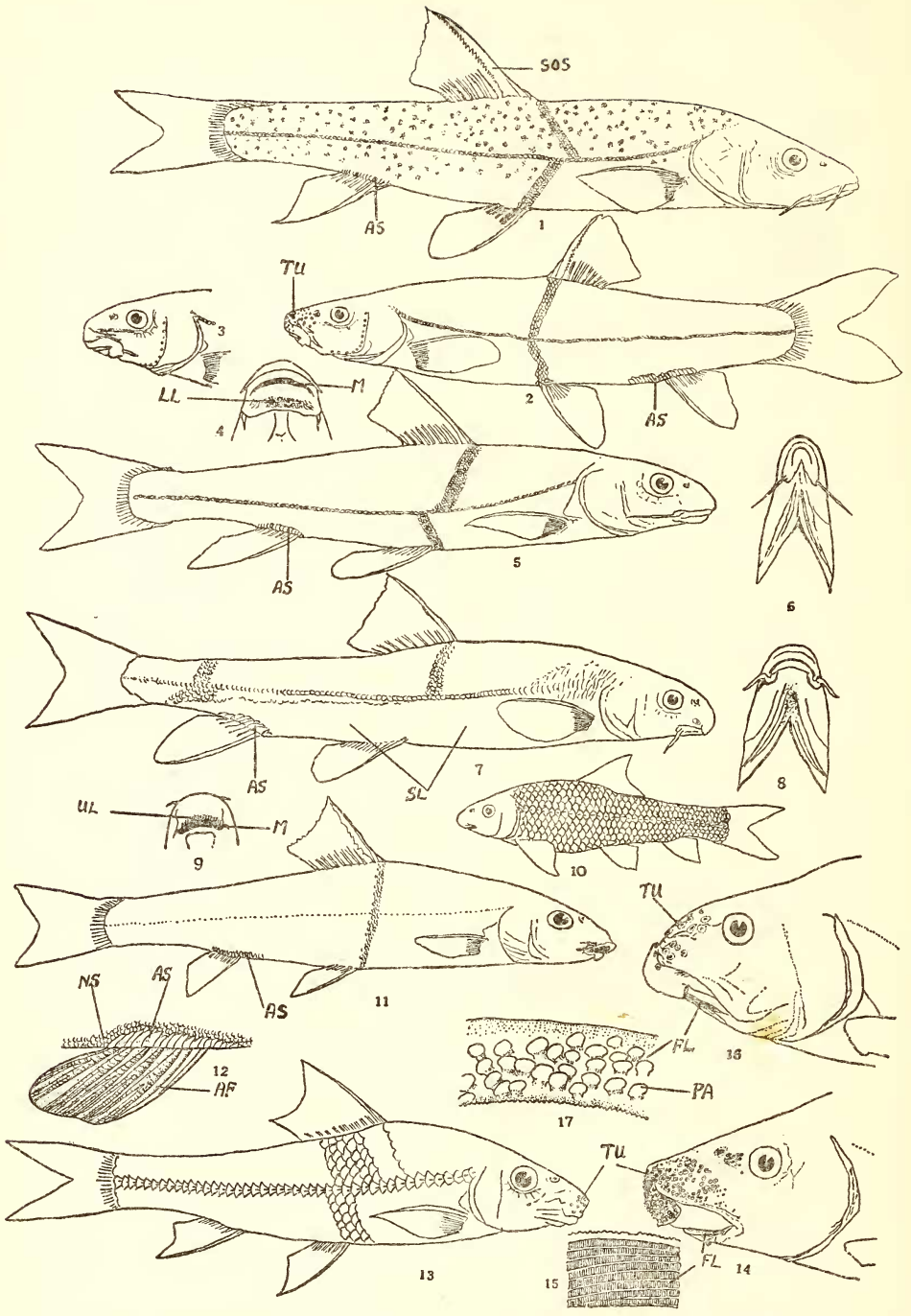
In conclusion I hope that this paper, wherein the nomenclature of Heckel's species (Heckel, op. cit.) is codified and a working 'Key' is given for the identification of all the species known from the Kashmir Valley, will stimulate greater interest in the study of the ichthyofauna of this area. Racial studies of the Schizothoracinae, especially the important species such as *S. esocinus*, *S. curvifrons*, *O. plagiostomus*, etc., are lacking. Investigations hitherto on natural hybrids between species of the Schizothoracinae have been cursory, and detailed observations on this aspect will be of interest. It is also hoped that this account will aid in the preparation of a comprehensive work on the fishes of Kashmir.

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Outline drawings of Kashmir fishes showing diagnostic characters
For explanation see p. 73.



Outline drawings of Kashmir fishes showing diagnostic characters
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Officer, Central Marine Fisheries Research Station, for giving me facilities for working at this Station and completing this account.

Explanation to Plate I

Outline drawings of Kashmir fishes showing diagnostic characters

1. *Tor putitora* Hamilton; 2. Ventral view of anterior part of head of same; 3. Ventral view of anterior part of head of *Noemacheilus* showing disposition of three pairs of barbels; 4. *Noemacheilus kashmirensis* Hora; 5. *Noemacheilus rupicola* (McClelland); 6. *Gambusia affinis holbrookii* Girard, female; 7. Same, Male; 8. *Glyptothorax kashmirensis* Hora, Male; 9. Same, Female; 10. Pectoral spine of same; 11. Outer pectoral spine of *Glyptosternum reticulatum* McClelland showing pinnate condition; 12. Thoracic adhesive disc of *G. kashmirensis*; 13. Ventral view of *G. reticulatum*; 14. *Ompok bimaculatus* (Bloch); 15. The Brown Trout, *Salmo trutta fario* Linnaeus.

(Figures 1, 4, 8, 9 & 12 after Hora; 6 & 7 after Prashad & Hora; 14 after Day; 11 & 13 after Hora & Silas)

Abbreviations: AD=Adipose dorsal fin; B=three pairs of barbels; IOR=Part of anal fin modified into intromittent organ; LLI=Lateral line; ML=Median lobe of lower lip; OPS=Outermost pectoral spine which is soft and pinnate; OS=Strong osseus dorsal spine; PS=Osseus and denticulated pectoral spine; TD=Thoracic adhesive disc.

Explanation to Plate II

Outline drawings of Kashmir fishes showing diagnostic characters

1. *Schizothorax esocinus esocinus* Heckel; 2. *Oreinus plagiostomus plagiostomus* (Heckel), Male; 3. Head of female of same species; 4. Ventral view of anterior part of head of same species; 5. *Ptychobarbus conirostris* Steindachner; 6. Ventral view of head of same; 7. *Diptychus maculatus* Steindachner; 8. Ventral view of head of same; 9. Ventral view of anterior part of head of *Crossocheilus*; 10. *Crossocheilus latius diplochilus* (Heckel); 11. *Schizothorax progastus* McClelland; 12. Region of anal fin and the vent in the Schizothoracinae showing disposition of enlarged scales forming the 'Anal sheath'; 13. *Labeo dyocheilus* (McClelland); 14. Head of same showing nature and disposition of tubercles; 15. Inner fold of lower lip of same showing the transverse folds, each fold in turn being striated; 16. Head of *Labeo dero* (Hamilton); 17. Inner fold of lower lip of same showing papillae. (Figures 1, 5-8, 11 & 13 after Day; 2, 3, & 10 after Misra; 14-17 after Hora)

Abbreviations: AF=Anal fin; AS=Anal sheath of scales; FL=Inner fold of lower lip; M=Mouth; LL=Lower lip; NS=Normal scales; PA=Papilla; SL=Scaless area; SOS=Strongly osseus and serrated dorsal spine; TU=Tubercles; UL=Upper lip joined to rostrum.

KEY TO THE IDENTIFICATION OF THE SPECIES

- 1a. Body totally scaleless 2
- 1b. Body partly or wholly scaled (exception being certain species of the family Cobitidae) 4
- 2a. Body laterally compressed ; barbels two pairs ; an adipose dorsal fin absent ; anal fin greatly elongate with 53 or more rays
Ompok bimaculatus (Bloch) (Pl. I, fig. 14)
- 2b. Body depressed and ventrally flattened ; barbels four pairs ; an adipose dorsal fin present ; anal fin short with not more than 6 branched rays . . . 3
- 3a. A longitudinally striated thoracic adhesive disc present ; pectoral spine osseous and denticulated along its inner border
Glyptothorax kashmirensis Hora (Pl. I, figs. 8, 9, 10 & 12)
- 3b. A longitudinally striated thoracic adhesive disc absent ; pectoral spine weak and pinnate along its inner border
Glyptosternum reticulatum McClelland (Pl. I, figs. 11 & 13)
- 4a. Jaws with teeth 5
- 4b. Jaws edentulous 6
- 5a. Large fish with an adipose dorsal fin some distance behind rayed dorsal fin ; origin of rayed dorsal ahead of that of pelvic fin ; scales numerous with 120 or more along lateral line ; anal fin of male like that of female ; egg-layer
Salmo trutta fario Linnaeus (Pl. I, fig. 15)
- 5b. Small minnow-like fish without an adipose dorsal fin ; origin of rayed dorsal considerably behind that of pelvic fin ; scales few, not exceeding 35 along mid-lateral line ; anal fin of male unlike that of female, modified into an intromittent organ ; live-bearer
Gambusia affinis holbrookii Girard (Pl. I, figs. 6 & 7)
- 6a. Barbels absent or when present one or two pairs only (Cyprinidae) . . . 7
- 6b. Barbels three or four pairs present (Cobitidae) 22
- 7a. Vent and base of anal fin ensheathed by large imbricate or tiled scales (Schizothoracinae) 8
- 7b. Vent and base of anal fin not ensheathed by imbricate or tiled scales (Cyprininae) 19
- 8a. Margin of lower jaw with an exposed horny covering ; lower lip thick, reflected from jaw, papillated and with a free margin
Oreinus plagiostomus plagiostomus (Heckel) (Pl. II, figs. 2, 3 & 4)
- 8b. Margin of lower jaw without an exposed horny covering ; lower-lip not reflected from jaw, nor papillated, nor with a free posterior margin . . . 9
- 9a. One pair of maxillary barbels ; pharyngeal teeth biserial 10
- 9b. Two pairs of barbels, one pair rostral and one pair maxillary ; pharyngeal teeth triserial 11
- 10a. Body completely covered with small scales ; origin of dorsal fin almost opposite that of pelvic fin ; pectoral fin separated from pelvic origin by about half its length
Ptychobarbus conirostris Steindachner (Pl. II, figs. 5 & 6)
- 10b. Body not completely covered with scales, they being present on upper two-thirds of body, thoracic region and sides of caudal peduncle including the scaly sheath from vent to base of anal fin ; origin of dorsal fin markedly

ahead of that of pelvic fin ; pectoral fin separated from pelvic origin by a distance equal to or more than its own length

Diptychus maculatus Steindachner (Pl. II, figs. 7 & 8)

- 11a. Post-labial groove continuous
Schizothorax progastus McClelland (Pl. II, fig. 11)
- 11b. Post-labial groove interrupted in the middle 12
- 12a. Origin of dorsal fin distinctly nearer base of caudal than to tip of snout 13
- 12b. Origin of dorsal midway between or nearer to tip of snout than to base of caudal fin 15
- 13a. Snout pointed ; greatest height of body much more than five times in standard length (5.5 to 7.0) ; blackish brown spots on upper half of body, base of dorsal, caudal, and inner sides of pectoral fins ; attaining large size and weighing as much as 24 pounds
Schizothorax esocinus esocinus Heckel (Pl. II, fig. 1)
- 13b. Snout bluntly rounded ; greatest height of body five times or less in standard length ; body devoid of blackish brown spots ; moderate size, weighing not more than 7 pounds 14
- 14a. Barbels rudimentary ; diameter of eye 4.0 to 4.5 in head and 1.0 to 1.3 in snout length ; distance between origins of pelvic and anal fins contained more than four times (4.25) in standard length
Schizothorax micropogon Heckel
- 14b. Barbels well developed, atleast as long as diameter of eye ; latter 5.0 to 5.5 in head length and about 1.5 in snout length ; distance between origins of pelvic and anal fins contained less than four times (about 3.75) in standard length
Schizothorax planifrons Heckel
- 15a. Largest scales of anal sheath as broad as or broader than diameter of eye ; scales along lateral line about 120
Schizothorax hugelii Heckel
- 15b. Largest scale of anal sheath small, being not more than half diameter of eye ; scales along lateral line 110 or less 16
- 16a. Length of longest anal ray contained five times or less in standard length ; diameter of eye contained less than five (4.5) in head length
Schizothorax longipinnis Heckel
- 16b. Length of longest anal ray contained six or more times in standard length ; diameter of eye contained more than five times in head length .. 17
- 17a. Dorsal fin short, its height contained 5.5 to 6.0 in standard length
Schizothorax nasus Heckel
- 17b. Dorsal fin moderately high, its height contained 4.75 to 5.0 in standard length 18
- 18a. Diameter of eye 5.0 to 5.5 in head length ; perforated scales along lateral line 98 to 102, none larger than those on adjoining rows ; edge of front gill cover oblique
Schizothorax curvifrons curvifrons Heckel
- 18b. Diameter of eye 6.0 to 7.0 in head length ; perforated scales along lateral line 91 to 95, being slightly larger and elliptical than those on adjoining rows ; edge of gill cover convex
Schizothorax curvifrons niger Heckel
- 19a. Upper lip separated from rostrum by a deep groove 20

- 19b. Upper lip confluent with the skin of the rostrum
Crossocheilus latius diplochilus (Heckel) (Pl. II, figs. 9 & 10)
- 20a. Mouth terminal ; scales large, about 25 to 28 along lateral line ; lower lip produced into a median lobe and post-labial groove continuous; last undivided dorsal ray strongly ossified
Tor putitora Hamilton (Pl. I, figs. 1 & 2)
- 20b. Mouth inferior ; scales smaller, about 41 to 45 along lateral line ; lower lip not produced into a median lobe and post-labial groove interrupted in the middle ; last undivided dorsal ray not strongly ossified 21
- 21a. Dorsal with 9 or 10 branched rays ; inner surface of lower lip closely papillated
Labeo dero (Hamilton) (Pl. II, figs. 16 & 17)
- 21b. Dorsal with 11 branched rays ; inner surface of lower lip striated with transverse folds
Labeo dyocheilus (McClelland) (Pl. II, figs. 13, 14 & 15)
- 22a. Barbels four pairs ; body greatly compressed and deep ; bifid backwardly directed suborbital bony spine present in both sexes
Botia birdi Chaudhuri
- 22b. Barbels three pairs ; body subcylindrical ; bifid backwardly directed suborbital spine absent 23
- 23a. Body with distinct dark vertical bands descending from back to ventral side and alternating with lighter bands
Noemacheilus rupicola (McClelland) (Pl. I, fig. 5)
- 23b. Body without dark vertical bands and alternating lighter bands .. 24
- 24a. Pelvic fins fall short of vent by considerable distance
Noemacheilus gracilis Day
- 24b. Pelvic fins reaching or surpassing vent 25
- 25a. Origin of dorsal fin midway between base of caudal and tip of snout .. 26
- 25b. Origin of dorsal nearer to base of caudal than to tip of snout .. 28
- 26a. Lateral line incomplete consisting of only a few pores and not extending beyond vertical from free end of pectoral fin
Noemacheilus vittatus (Heckel)
- 26b. Lateral line complete or clearly defined up to vertical opposite posterior end of anal base, being indistinct on the caudal peduncle (exception being female *N. yasinensis* in which L.l. is clear only up to above pelvic fin) .. 27
- 27a. Pectoral as long as or slightly longer than head ; least height of caudal peduncle about as broad as diameter of eye in specimens over 55 mm. in standard length
Noemacheilus yasinensis Alcock (Male)
- 27b. Pectorals shorter than head length ; least height of caudal peduncle considerably greater than diameter of eye in specimens over 55 mm. in standard length
Noemacheilus kashmirensis Hora (Pl. I, fig. 4)
- 28a. Snout and post orbital part of head of equal length ; anal fin separated from caudal by a distance almost equal to its own length
Noemacheilus marmoratus (Heckel)
- 28b. Snout shorter than post-orbital part of head ; anal fin separated from caudal fin by a distance considerably lesser than its own length
Noemacheilus yasinensis Alcock (Female)

REFERENCES

- Chaudhuri, B. L. (1909) : Description of new species of *Botia* (*B. birdi*) and *Nemachilus* (*N. macmahoni*). *Rec. Ind. Mus.* **3** : 339-42.
- Day, F. (1876) : On the fishes of Yarkand. *Proc. Zool. Soc. London*: 781-807.
- (1878a) : Scientific results of the Second Yarkand Mission. Ichthyology. Calcutta. 1-25 with 5 pls.
- (1878b) : The Fishes of India, being a Natural History of the Fishes known to inhabit the Seas and Freshwaters of India, Burma, and Ceylon.
- Günther, A. (1864 & 1868) : Catalogue of Fishes of the British Museum. Vols. **5 & 7**.
- Heckel, J. J. (1838) : Fische aus Caschmir.
- (1844) : Fische Kaschmir's in von Hugel's : Kaschmir und das Reich der Siek, Bd. **4**, abth. **2** : 351-384.
- Hora, S. L. (1922a) : Notes on fishes in the Indian Museum III. On fishes belonging to the family Cobitidae from high altitudes in Central Asia. *Rec. Ind. Mus.* **24** : 63-83.
- (1922b) : Notes on fishes in the Indian Museum IV. On fishes belonging to the genus *Botia* (Cobitidae). *Ibid.* **24** : 313-321.
- (1934) : The fish of Chitral. *Ibid.* **36** : 279-319.
- (1936) : Yale North Indian Expedition, Article XVIII. Report on Fishes, Part 1, Cobitidae. *Mem. Conn. Acad. Sci.* **10** : 299-321.
- (1937) : On fossil fish-remains from the Karewas of Kashmir. *Rec. Geol. Surv. India* **72** (2) : 178-187.
- (1939) : The Game Fishes of India VIII. The Mahseers or the Large scaled barbels of India I. The Putitor Mahseer, *Barbus* (*Tor*) *putitora* (Hamilton). *J. Bombay nat. Hist. Soc.* **41** : 272-285.
- (1955) : Fisheries of certain tropical fishes in natural cold waters of India. *Ibid.* **53** (1) : 138-140.
- Hora, S. L. & Silas, E. G. (1952a) : Notes on Fishes in the Indian Museum. XLVII. Revision of the Glyptosternoid fishes of the family Sisoridae, with description of new genera and species. *Rec. Ind. Mus.* **49** : 5-30.
- (1952b) : Evolution and distribution of Glyptosternoid fishes of the family Sisoridae (Order: Siluroidea). *Proc. Nat. Inst. Sci. India* **18** (4) : 309-322.
- Hora, S. L., Mulick, G. M., & Khajuria, H. (1955) : Some interesting features of the aquatic fauna of the Kashmir Valley. *J. Bombay nat. Hist. Soc.* **53** (1) : 140-3.
- McClelland, J. (1839) : Indian Cyprinidae. *Asiat. Research.* **19** (2) : 217-471.
- Misra, K. S. (1949) : A note on the systematic position of two cyprinid fishes of the genus *Oreinus* McClelland from Kashmir. *J. Zool. Soc. India* **1** (3) : 39-40.
- Mitchell, F. J. (1916) : Large Kashmir Brown Trout, *Salmo fario*. *J. Bombay nat. Hist. Soc.* **24** (2) : 371-372 (with one photograph).
- (1918) : How trout were introduced into Kashmir. *Ibid.* **26** (1) : 295-299.
- Mukerji, D. D. (1935) : Report on Burmese fishes collected by Lt.-Col. R. W. Burton from the tributary streams of the Mali Hka River of the Myitkyina District, (Upper Burma). *Ibid.* **37** (1) : 38-80.
- (1936) : Yale North Indian Expedition, Article 18. Report on fishes, part 2. Sisoridae and Cyprinidae. *Mem. Conn. Acad. Sci.* **10** : 323-359.
- Ross, E. J. (1939) : Trout fishing in Kashmir. *J. Bombay nat. Hist. Soc.* **41**(2) : 437-442.
- Steindachner, F. (1866) : Zur Fisch fauna Kaschmirs und der benachbarten Landerstriche. *Verh. Zool-Bot. Ges. Wein* **16** : 784-796.
- Valenciennes, A. (1840 & 1842) : Historie Naturelle des Poissons. Vols. **15 & 16**.